CLAIMS

Therefore, having thus described the invention, at least the following is claimed:

1. A method for encoding fractional bit rates in a pulse amplitude modulation (PAM) communication system, comprising:

receiving information associated with a destination transceiver, the information relating to a plurality of PAM levels supported by the destination transceiver; and

based on the information associated with the destination transceiver, encoding an integer number of bits into a plurality of symbols, the ratio of the integer number of bits and the plurality of symbols being a non-integer.

2. The method of claim 1, further comprising, based on the information associated with the destination transceiver, encoding each of the plurality of symbols into one of a plurality of analog symbols corresponding to a signal space constellation.

3. The method of claim 2, wherein the encoding an integer number of bits into a plurality of symbols involves modulus conversion.

4. The method of claim 2, wherein the encoding an integer number of bits into a plurality of symbols involves shell mapping.

5. The method of claim 2, wherein the encoding an integer number of bits into a plurality of symbols involves constellation switching.

6. The method of claim 2, wherein the information associated with the destination transceiver comprises a first look-up table and the encoding an integer number of bits into a plurality of symbols involves the first look-up table.

7. The method of claim 2, wherein the information associated with the destination transceiver further comprises a second look-up table and the encoding each of the plurality of symbols into one of a plurality of analog symbols involves the second look-up table.

8. The method of claim 2, wherein the information associated with the destination transceiver further comprises an encoding algorithm and the encoding an integer number of bits into a plurality of symbols is performed using the encoding algorithm.

9. The method of claim 2, wherein the encoding each of the plurality of symbols into one of a plurality of analog symbols corresponding to a signal space constellation is further based on the output of a forward error correction code device.

10. The method of claim 2, further comprising applying each of the plurality of analog symbols to a gain scalar.

11. The method of claim 2, further comprising providing the plurality of analog symbols on a pulse amplitude level to the destination transceiver.

12. The method of claim 11, wherein the providing the plurality of analog symbols on a pulse amplitude level to the destination transceiver is via a digital subscriber line (DSL).

13. The method of claim 12, further comprising receiving payment for providing the plurality of analog symbols.

14. A transceiver, comprising:

a means for receiving information associated with a destination transceiver, the information relating to a plurality of pulse amplitude modulation (PAM) levels supported by the destination transceiver;

a means for encoding, based on the information associated with the destination transceiver, an integer number of bits into a plurality of symbols, the ratio of the integer number of bits and the plurality of symbols being a non-integer.

15. The transceiver of claim 14, further comprising, a means for encoding, based on the information associated with the destination transceiver, each of the plurality of symbols into one of a plurality of analog symbols corresponding to a signal space constellation.

16. The transceiver of claim 15, wherein the means for encoding an integer number of bits into a plurality of symbols involves a modulus conversion means.

17. The transceiver of claim 15, wherein the means for encoding an integer number of bits into a plurality of symbols involves a shell mapping means.

18. The transceiver of claim 15, wherein the means for encoding an integer number of bits into a plurality of symbols involves a constellation switching means.

19. The transceiver of claim 15, wherein the information associated with the destination transceiver comprises a first look-up table and the encoding an integer number of bits into a plurality of symbols involves the first look-up table.

20. The transceiver of claim 15, wherein the information associated with the destination transceiver further comprises a second look-up table and the encoding each of the plurality of symbols into one of a plurality of analog symbols involves the second look-up table.

21. The transceiver of claim 15, wherein the information associated with the destination transceiver further comprises an encoding algorithm and the encoding an integer number of bits into a plurality of symbols is performed using the encoding algorithm.

22. The transceiver of claim 15, wherein the encoding each of the plurality of symbols into one of a plurality of analog symbols corresponding to a signal space constellation is further based on the output of a forward error correction encoding means.

23. The transceiver of claim 15, further comprising a means for gain scaling each of the plurality of analog symbols.

24. The transceiver of claim 15, further comprising a means for providing the plurality of analog symbols to the destination transceiver.

25. The transceiver of claim 24, wherein the plurality of analog symbols are provided to the destination transceiver via a digital subscriber line (DSL).

26. A transceiver for use in a pulse amplitude modulation (PAM) communication system, comprising:

a receiver adapted to receive information associated with a destination transceiver, the information relating to a plurality of PAM levels supported by the destination receiver;

a fractional encoder associated with the receiver, the fractional encoder adapted to encode an integer number of bits into a plurality of symbols based on the information associated with the destination transceiver, the ratio of the integer number of bits and the plurality of symbols being a non-integer;

a PAM mapper associated with the fractional encoder, the PAM mapper adapted to encode, based on the information associated with the destination transceiver, each of the plurality of symbols into one of a plurality of analog symbols corresponding to a signal space constellation; and

a transmitter associated with the PAM mapper, the transmitter adapted to provide the plurality of analog symbols to the destination transceiver.

27. The transceiver of claim 26, wherein the fractional encoder encodes the integer number of bits into the plurality of symbols via modulus conversion.

28. The transceiver of claim 26, wherein the fractional encoder encodes the integer number of bits into the plurality of symbols via shell mapping.

29. The transceiver of claim 26, wherein the fractional encoder encodes the integer number of bits into the plurality of symbols via constellation switching.

30. The transceiver of claim 26, wherein the information associated with the destination transceiver comprises a first look-up table and the fractional encoder is adapted to encode the integer number of bits into the plurality of symbols based on the first look-up table.

31. The transceiver of claim 30, wherein the information associated with the destination transceiver further comprises a second look-up table and the PAM mapper is

adapted to encode each of the plurality of symbols into one of the plurality of analog symbols based on the second look-up table.

32. The transceiver of claim 26, wherein the information associated with the destination transceiver comprises an encoding algorithm and the fractional encoder is further adapted to implement the encoding algorithm to encode the integer number of bits into the plurality of symbols

33. The transceiver of claim 26, wherein the PAM mapper is further adapted to encode each of the plurality of symbols into one of the plurality of analog symbols corresponding to the signal space constellation based on the output of a forward error correction code encoder.

34. The transceiver of claim 26, further comprising a gain scalar.

35. The transceiver of claim 26, wherein the plurality of analog symbols are provided to a digital subscriber line (DSL).

36. A method for controlling the symbol transmission rate in a pulse amplitude modulation (PAM) communication system, comprising:

providing information to a source transceiver, the information capable of being used to determine a fractional bit rate;

receiving a plurality of analog symbols from the source transceiver, each of the plurality of analog symbols corresponding to a PAM signal space constellation; and

decoding the plurality of analog symbols into an integer number of bits comprising a plurality of symbols, the ratio of the integer number of bits and the plurality of symbols being a non-integer corresponding to the fractional bit rate.

37. The method of claim 36, wherein the decoding the plurality of analog symbols involves modulus conversion.

38. The method of claim 36, wherein the decoding the plurality of analog symbols involves shell mapping.

39. The method of claim 36, wherein the decoding the plurality of analog symbols involves constellation switching.

40. The method of claim 36, wherein the information comprises a number of PAM levels.

41. The method of claim 36, wherein the information comprises a first look-up table adapted to enable the source transceiver to encode an integer number of bits into a plurality of symbols, wherein the ratio of the integer number of bits and the plurality of symbols conforms to the fractional value of the fractional bit rate.

42. The method of claim 41, wherein the information further comprises a second look-up table adapted to enable the source transceiver to encode each of the plurality of symbols into one of the plurality of analog symbols.

43. The method of claim 36, wherein the information further comprises an encoding algorithm adapted to enable the source transceiver to execute the encoding algorithm and encode at the fractional bit rate.

44. The method of claim 43, wherein the encoding algorithm involves modulus conversion.

45. The method of claim 43, wherein the encoding algorithm involves shell mapping.

46. The method of claim 43, wherein the encoding algorithm involves constellation switching.

47. A method for controlling the symbol rate supplied to a destination transceiver over a communication channel in a pulse amplitude modulation (PAM) communication system, comprising:

determining a maximum number of PAM levels capable of being supported by the destination transceiver and the communication channel;

providing information associated with the maximum number of PAM levels to a source transceiver;

receiving a plurality of analog symbols on the communication channel, each of the plurality of analog symbols corresponding to a signal space constellation and one of the maximum number of PAM levels; and

decoding the plurality of analog symbols into an integer number of bits comprising a plurality of symbols, the ratio of the integer number of bits and the plurality of symbols being a non-integer corresponding to a fractional bit rate associated with the maximum number of PAM levels.

48. A transceiver for use in a pulse amplitude modulation (PAM) communication system, comprising:

a means for providing information to a source transceiver, the information capable of being used to determine a fractional bit rate;

a means for receiving a plurality of analog symbols from the source transceiver, each of the plurality of analog symbols corresponding to a PAM signal space constellation; and

a means for decoding the plurality of analog symbols into an integer number of bits comprising a plurality of symbols, the ratio of the integer number of bits and the plurality of symbols being a non-integer corresponding to the fractional bit rate.

49. The transceiver of claim 48, wherein the means for decoding the plurality of analog symbols involves a modulus conversion means.

50. The transceiver of claim 48, wherein the means for decoding the plurality of analog symbols involves a shell mapping means.

51. The transceiver of claim 48, wherein the means for decoding the plurality of analog symbols involves a constellation switching means.

52. The transceiver of claim 48, wherein the information comprises a number of PAM levels.

53. The transceiver of claim 48, wherein the information comprises a first look-up table adapted to enable the source transceiver to encode an integer number of bits into a plurality of symbols, wherein the ratio of the integer number of bits and the plurality of symbols conforms to the fractional value of the fractional bit rate.

54. The transceiver of claim 53, wherein the information further comprises a second look-up table adapted to enable the source transceiver to encode each of the plurality of symbols into one of the plurality of analog symbols.

55. The transceiver of claim 48, wherein the information further comprises an encoding algorithm adapted to enable the source transceiver to execute the encoding algorithm and encode at the fractional bit rate.

56. The transceiver of claim 55, wherein the encoding algorithm involves modulus conversion.

57. The transceiver of claim 55, wherein the encoding algorithm involves shell mapping.

58. The transceiver of claim 55, wherein the encoding algorithm involves constellation switching.

59. A transceiver for use in a pulse amplitude modulation (PAM) communication system, comprising:

a means for determining a maximum number of PAM levels capable of being supported by the destination transceiver and the communication channel;

a means for providing information associated with the maximum number of PAM levels to a source transceiver;

a means for receiving a plurality of analog symbols on the communication channel, each of the plurality of analog symbols corresponding to a signal space constellation and one of the maximum number of PAM levels; and

a means for decoding the plurality of analog symbols into an integer number of bits comprising a plurality of symbols, the ratio of the integer number of bits and the plurality of symbols being a non-integer corresponding to a fractional bit rate associated with the maximum number of PAM levels.

60. A transceiver for use in a pulse amplitude modulation (PAM) communication system, comprising:

a transmitter adapted to provide information to a source transceiver, the information capable of being used to determine a fractional bit rate;

a receiver adapted to receive a plurality of analog symbols from the source transceiver, each of the plurality of analog symbols corresponding to a PAM signal space constellation; and

a fractional decoder adapted to decode the plurality of analog symbols into an integer number of bits comprising a plurality of symbols, the ratio of the integer number of bits and the plurality of symbols being a non-integer corresponding to the fractional bit rate.

61. The transceiver of claim 60, wherein the fractional decoder is a modulus converter.

62. The transceiver of claim 60, wherein the fractional decoder is a shell mapper.

63. The transceiver of claim 60, wherein the fractional decoder employs constellation switching.

64. The transceiver of claim 60, wherein the information comprises a number of PAM levels.

65. The transceiver of claim 60, wherein the information comprises a first look-up table adapted to enable the source transceiver to encode an integer number of bits into a plurality of symbols, wherein the ratio of the integer number of bits and the plurality of symbols conforms to the fractional value of the fractional bit rate.

66. The transceiver of claim 66, wherein the information further comprises a second look-up table adapted to enable the source transceiver to encode each of the plurality of symbols into one of the plurality of analog symbols.

67. The transceiver of claim 60, wherein the information further comprises an encoding algorithm adapted to enable the source transceiver to execute the encoding algorithm and encode at the fractional bit rate.

68. The transceiver of claim 67, wherein the encoding algorithm involves modulus conversion.

69. The transceiver of claim 67, wherein the encoding algorithm involves shell mapping.

70. The transceiver of claim 67, wherein the encoding algorithm involves constellation switching.